Chapter 40

# Bridging the Digital Divide

**Reported by Uday Mohan**

*Expensive, potentially disruptive, and extraordinarily beneficial, ICTs are here to stay, and developing countries can ill afford to sit on the sidelines.*

Before the Internet came to Veerampattinam, a coastal village in southern India, the local fisher folk went to get their daily catch without knowing sea conditions or the location of fish shoals. Lives were sometimes lost because of particularly high waves and rough seas. But in late 1998, the M.S. Swaminathan Research Foundation (MSSRF), an Indian research center, installed a computer in a "village information shop" with financial assistance from the International Development Research Centre, Canada.

Through a wireless local-area network based on radio frequencies, the computer makes available daily data on wave height and wind forecasts from a U.S. Navy website. This information is broadcast to the villagers in the early morning via loudspeakers on the roof of the information shop.

Armed with this knowledge as well as with details about fish location, the fishermen now ply the seas in greater safety and with more efficiency. Not only has the Internet-enabled computer made the main work of the village easier, but it has also made information about prices, health and transportation facilities, and entitlement schemes accessible. Indeed, before the computer arrived, villagers were unaware of housing loans that they were entitled to. Most fishermen in the village have now benefited from these low-cost loans.

Veerampattinam is one of many recent examples of the way the Internet has reached and benefited the poor in developing countries. Although small in scale,

these examples have posed a challenge to the view that the Internet belongs to the technologically advanced and that it would be out of place in poor rural areas. As M.S. Swaminathan, MSSRF's chairman of the board, says, "The technological empowerment of the poor adds value to their work and lives. Just as with the Green Revolution, information technology in the hands of small producers, particularly women, benefits everyone, whereas information technology in the hands only of the rich does not."

Without doubt the Internet and other information and communication technologies (ICTs), such as faxes, video, digital radio, mobile phones, and satellite technologies, have helped people gain access to, process, respond to, and distribute information in a faster and more far-reaching way than ever before. This ongoing shift toward a more information-intensive society gives both added weight and new meaning to the old maxim, "information is power."

ICTs at a minimum can enhance the livelihoods of the poor and improve market efficiency. As development tools in their own right, ICTs can also help lead to higher literacy rates through distance learning; gender equality through the empowerment of women who gain greater access to economic opportunities and civil society; sustainable development through easier dissemination of appropriate information; more balanced social relations through the greater accountability imposed on the powerful by the marginalized; and other global goods. Hans d'Orville, former director of the Information Technology for Development Programme at the United Nations Development Programme (UNDP), puts it this way: "Information technology has a place alongside adequate food, health care, education, and other fundamentals. By taking this place it has broadened our definition of poverty. Those people or countries who cannot or will not participate fully in the new information economy will find it all the more difficult to climb out of poverty."

## The Digital Divide

The importance of ICTs is precisely why concern has escalated over the "digital divide"—the gap in information and communication technologies that exists between technologically advanced and developing countries, poor and rich, men and women, and urban and rural areas. Recent high-level international meetings, such as the Global Knowledge II conference this past March in Malaysia and the July G-8 summit in Japan, have pressed for solutions to the divide.

An array of numbers illustrates the vast gap that has to be bridged: Nua Internet Surveys estimates that about 333 million people worldwide were online as of June of this year, but as many as 72 percent of them resided in North America and Europe. Africa claimed only 2.8 million Internet subscribers, Asia/Pacific 75.5 mil-

lion, Middle East 1.9 million, and South America 13.2 million. In 1998, according to the International Telecommunications Union (ITU), low-income countries had 6.2 personal computers and 45 fixed-line and mobile phones per 1,000 people, whereas high-income countries had 311 and 832, respectively.

The digital divide is not only enormous—dwarfing even the per capita income gap ratio between high- and low-income countries—but it is increasing, according to a recent World Bank study. The authors of the study, Francisco Rodriguez and Ernest Wilson III, estimate that even East Asia, which is adopting ICTs at a rapid pace, will take another 40 years to catch up with the developed world. Inevitably, access varies widely among and within developing countries as well. Only 11 of 53 African countries for which there are data have 10,000 or more Internet users; 17 have fewer than 1,000. Gender, income, age, and other disparities also abound. In Ethiopia, for example, 98 percent of Internet users in 1998 were university graduates and 86 percent were male.

As the Internet becomes the norm for commerce and information exchange in the developed world, the poorer countries will have little choice but to try to bridge the digital divide in all its forms. They will go online to become competitive in the new economy or forgo significant growth. The stakes involve not only social development and productivity growth, but also the burgeoning e-commerce sector, which is expected to reach between US$2 and 3 trillion in transactions in the next three years.

## Connecting the Poor

The last few years have witnessed a flurry of activity as the development community has put forward position papers and proposals and launched pilot projects to include the poor in the information revolution. Projects have ranged from providing price information to farmers to boosting microcredit-based sales via the web.

The hallmarks of this activity have been diversity and innovation in organization, technology, and funding. Results are trickling in, and no formula has emerged, though some ingredients appear to be critical. According to Roger Noll, professor of economics and director of the Public Policy Program at Stanford University, "Technological change has greatly affected the optimal strategy for starting ICT service. In many cases, fixed wireless is better for new networks because of its lower cost and quicker availability. And because economies of scale are not very important in wireless, competition is often feasible right from the start. Another common ingredient is that western-style universal service is not a practical reality in developing countries, where much of the population is too poor to afford individual access. The focus instead should be on convenient access through sharing, such as with telecenters and pay phones."

## Meeting Community Needs with ICTs

This need to minimize cost but maximize rural access drives most ICT projects in developing countries. Not surprisingly, the Internet still often plays a lesser role than other technologies in the distribution of information in rural areas. Most farmers, for example, are years away from getting price information through the Internet because of cost and lack of human resources and adequate phone infrastructure in rural areas. But because a farmer's decisions about where, when, and how much to sell depend on the signals sent by national and international market prices, ICT proponents see the delivery of timely price information as one of the key benefits farmers can receive from the new information technologies. Consequently a number of ICT projects focus on making it easier for agricultural producers to access prices.

"Price information helps connect farmers to markets," says Mike Weber, professor and codirector of a food security program run by the Department of Agricultural Economics at Michigan State University (MSU), "and the more up-to-date the price information, the better for the farmer and the market." Weber's own group uses both low- and high-tech means to distribute prices. For the past ten years, the food security project has delivered weekly agricultural prices by newspaper and fax to government offices, the private sector, and nongovernmental organizations (NGOs) in Mozambique. MediaFax, a fax-based newspaper, provides the same information each week to a wider audience. NGOs make copies of the weekly price lists and distribute the information to farmers.

"Our first line of defense for the farmer is the fax and newspaper because they are inexpensive, and we also use the radio where possible," says Weber, "but the Internet plays a role too for those who can afford it. Our department at MSU hosts a website that provides comprehensive links to global market information, including the weekly price lists for Mozambique, but more than 50 percent of the hits right now come from U.S. farmers, traders, and analysts."

The Internet need not remain elusive, of course, as MSSRF has shown. Veerampattinam, the village in India, is actually one of five now hooked to the Internet as part of MSSRF's village information project. One of the villages serves as the information hub, with full access to the Internet. The others have wireless access only to the hub, to which they send information and requests for information. The hub searches the web and electronically delivers the requested information to the other centers, along with standard information in an email newsletter. This hub-and-spoke model avoids the cost of providing full Internet access to all villages and also creates a network for information sharing across the villages. MSSRF and its granters fund the project, asking only that the villagers house and operate the technology.

Some projects are devised to pay for themselves while providing developing-country poor with access to ICTs for socioeconomic development. Such is the case

with the projects facilitated by the International Institute for Communication and Development (IICD), which was established by the Dutch Ministry for Development Cooperation in 1997. In Jamaica, for example, IICD and its partners are helping to put in place a comprehensive agribusiness information system that will enable small farmers, who are losing ground in the global marketplace, to get both print- and web-based information about markets, products, registration requirements, and technical assistance.

This demand-driven system makes information available through a continually updated database on domestic agricultural production and marketing and through the Internet. Extension agents collect the information from producers and traders using palm-top computers. The information is then downloaded to PCs located in primary extension offices. These PCs are linked to the central database at the headquarters of the Rural Agricultural Development Authority. The system is currently being tested with 80 small farmers and traders in two regions in Jamaica.

The method for delivering information is still evolving. Currently large farmers and traders with access to the Internet get the information easily. Smaller farmers and traders generally visit the extension offices, where they can obtain standardized and customized reports in hard copy. If literacy is a problem, extension officers help interpret documents. A small subscription fee makes the project sustainable, and small farmers can pool their resources and subscribe as a group.

The project will eventually extend throughout Jamaica and is expected to reach 50,000 direct users and 150,000 indirect users. Ingrid Hagen, IICD's manager of Private and Public Sector Partnerships, observes, "Access is giving these Jamaican farmers a chance to compete seriously with imports that are crowding them out of markets, even for the main domestic products. The technical, regulatory, and market demands increasingly in force due to globalization can be met only with the help of ICTs."

The belief that ICTs have a role to play in the lives of small farmers has led to their introduction in many rural areas. But most projects remain relatively small-scale and not widely replicated because of cost, the multitude of approaches and local needs, and lack of interest from the private sector.

These factors, and the fact that ICT introduction is still at an early stage in developing countries, make the impact of projects hard to judge. "Undoubtedly ICTs are very useful for the people who have an opportunity to use them, but there is also a lot of hype about what computers and the Internet can do for rural people," says Cynthia Hewitt de Alcántara, deputy director of the United Nations Research Institute for Social Development and coordinator of its program on Information Technologies and Social Development. "Some serious social science research is needed to understand the institutional context that can make these technologies really useful and sustainable in specific rural settings," she adds, "and it is

not the Internet that is always most important. Older technologies too, such as community radio, are opening up societies and allowing people to talk to each other. The telephone, of course, remains vital to people's well-being."

## Using Mobile Phones

Perhaps the best-known example of bringing telephones to the poor is GrameenPhone, the Grameen Bank's rapidly growing cellular phone business in Bangladesh. A little more than three years old, the venture has already put mobile phones in the hands of women in more than 1,200 Bangladeshi villages. At the same time, GrameenPhone has secured more than 50 percent of the national, primarily urban, mobile phone market in Bangladesh, thus helping to assure both its financial ability to serve rural areas and its technical ability to create a reliable urban network with which to link the rural population.

In the villages, GrameenPhone works on the same principle as the Grameen Bank's microloan program, giving rural women from landless households access to credit. A woman who has already established good credit with the Bank, whose house is located in a fairly central part of the village, and whose family has one member familiar with the English letters and numbers on a phone, can borrow the roughly $350 needed to purchase a solar-powered mobile phone. After a day's training, the woman is set to provide phone service to other villagers for a price. This access to technology not only generates substantial income for the "telephone woman," who on average earns $450 a year after expenses, but also provides villagers with access to information and services that would otherwise remain far outside their reach.

The villagers, for example, can contact medical help immediately; get prevailing market prices for the crops they grow, thus avoiding underpayment by opportunistic traders; engage in commercial activities that require quick or frequent access to timetables, regulations, or other market-related information; and easily keep in touch with family members living in the cities or abroad. The arrival of the cell phone has also, for once, turned the social pecking order on its head as the relatively wealthy rely on the poor to keep in touch with the outside world.

"Money, the old saying goes, speaks loudest, but it is user-friendly technology that begets money in the first place," says Nuimuddin Chowdhury, an IFPRI consultant on ICTs. "The GrameenPhone project has shown once again that the rural poor are among the most eager to innovate, and they could significantly improve their income if given access to ICTs, which are, moreover, environmentally clean technologies."

## Using Satellites

For developing countries, bridging the digital divide generally means bridging the gap between super-sophisticated technology on the one hand and local logistics and

financial ability to pay on the other. Because satellites can bring ICTs to rural areas at a relatively low cost, some NGOs promote them to help fill the information and communication needs in developing countries. Volunteers in Technical Assistance (VITA), a U.S.-based NGO, for example, links its satellite with ground terminals that enable users to send and receive stored emails four to six times a day as the satellite passes overhead.

Kept in a community center or some other central location, each terminal is estimated to serve an area of roughly 10,000 people via the email access it gives to schools, clinics, NGOs, business people, and individual users. VITA's planned services include continually updated web indexes designed to meet the information needs of remote communities and a research service to maximize the impact of the 50-page limit that can be downloaded each day by each terminal. Costs for these services and for supporting the system will be defrayed by a relatively small annual fee per terminal and by proposed private-sector use of a portion of VITA's satellite bandwidth in exchange for technological production and support.

Currently at the experimental stage, the project serves 25 terminals. VITA plans to deploy 2,500 terminals throughout the developing world. "Basically we're trying to push the envelope to give the poor access to a culture of information," says George Scharffenberger, president of VITA. "Instant access to the Internet is exciting, but for a third to a half of humanity affordable access is still several years away. In the meantime, satellites can provide low-cost communication and information services to poor and remote areas while building critical information skills among teachers, health workers, people in small businesses, women, and youth."

VITA's other partner in this venture, SATELLIFE, also runs a health information system, HealthNet, which works through a satellite-terminal system similar to VITA's and through modem-to-modem telephone links. One of Africa's first sources for email, HealthNet also provides electronic publications, access to the web, and discussion groups, including one on AIDS, to about 10,000 health professionals worldwide. Locally owned and operated, HealthNet has been helpful in dramatic cases, such as containment of an Ebola virus outbreak in Gabon, as well as in more routine health care. It has succeeded in those countries where an adequate institutional structure exists or can be built to support ICTs, where training of technical staff matches investments in technology, and where a successful business model has been implemented to offset operating expenses.

"Once familiarity with a computer-based information culture has taken root and the medical benefits have become evident," says Rebecca Riccio, SATELLIFE's director of programs, "we've routinely seen health professionals further develop that culture and demand a wider array of ICT applications, not only from us but from others."

After training at SATELLIFE's Regional Information Technology Training Centre in Kenya, for example, one participant, a medical director of a charitable dis-

pensary in Tanzania, became a telemedicine enthusiast, setting up a mailing list for his fellow trainees and seeking out how to transmit electrocardiograms and heart and lung sounds via the Internet to specialists for interpretation. "He also convinced management to provide two computers and set up an ICT training facility for his colleagues at the dispensary," says Eliazar Karan, project manager of HealthNet Kenya.

## Improving Women's Access to ICTs

As ICTs begin to play a greater role in development, concerns are growing that women will be left out of the picture. Available data show that women account for 25 percent of ICT users in Brazil, 17 percent in South Africa, 7 percent in China, and 4 percent in Arab states. All the gender faultlines are present in ICT access, with poor, uneducated, and older women particularly affected.

To address these concerns, the United Nations Development Fund for Women (UNIFEM), ITU, and UNDP recently signed an agreement guaranteeing the inclusion of gender issues in their policy dialogue and decisionmaking about ICTs. Going further, Noeleen Heyzer, UNIFEM's executive director, has advocated that UN bodies that are developing programs to promote ICTs should consider allocating 50 percent of these program funds and program activities to women and girls until the digital divide closes.

"ICTs give us a new opportunity to build a confident, skilled, and participatory knowledge community that includes women," says Heyzer, "and failure to do this will only worsen the existing gender-related gaps. We should be striving for 'e-quality.' Women and girls must receive the training and preparation to become users and producers of ICT technologies and to understand and shape the regulations and policies associated with these technologies."

## Overcoming the Barriers to Universal Access

The success of some local-level projects says little yet about what should be the method and timetable for delivering universal access. Even the dilemma about whether to focus first on building a national infrastructure for instant access or on building ICTs around specific development problems remains unresolved.

Some developing countries, such as Malaysia, have made commitments to rapid and widespread ICT introduction. Others may move forward, at least in the near future, on two tracks: partnering with the private sector to install ICTs in urban areas and looking to donors, lowest-cost methods, and innovative schemes for subsidizing subscription fees to connect rural areas, with the two tracks sometimes overlapping.

"The countries that have been most successful in promoting ICT-based development," says Carlos Primo Braga, program manager at infoDev (the World Bank's Information for Development Program), "are those that have created a broad framework for fostering both competition and universal access. They've focused on expansion of the capacity to connect to ICTs, education to use that connectivity, appropriate content in the local language to make that connectivity useful, and competition to lower prices and increase market growth."

Perhaps the most neglected component of this framework is a well-developed legal system to facilitate effective regulatory policy. "Developing countries repeatedly treat this issue cavalierly," says Noll, "as if constructing an independent, effective, and efficient administrative system is something that can be set up casually over a long weekend."

As if these systemic hurdles were not enough, some governments are wary of the power of information and the political and economic uses it can be put to, or simply skeptical about its importance. They show reluctance to embrace the ICT revolution.

But the most pressing and universal barrier remains money. D'Orville estimates that a telecenter that serves 2,000–6,000 people costs roughly $60,000–$80,000, a sum that includes provisions for training, content development, operations, maintenance, and management. Even so, the picture may not be so daunting because costs are decreasing and new technical devices are emerging. "Medium-developed countries already have high TV penetration, and devices to access the Internet are going to fall below the cost of TVs," says Josh Calder senior associate at Coates & Jarratt, Inc., a Washington, D.C.-based consulting firm that analyzes and forecasts ICT applications. "More people are expected to access the Web via mobile devices than through PCs in a few years, and mobile phones already have extensive penetration even in quite poor countries. High-tech systems tend to go where they are demanded—note the ubiquitous presence of sonogram clinics in the poorest neighborhoods of India."

Expensive, potentially disruptive, and extraordinarily beneficial, ICTs are here to stay, and developing countries can ill afford to sit on the sidelines. As Richard Heeks, senior lecturer in information systems and development at the University of Manchester, puts it, "Information and communication technology is a runaway horse, and the choice for the world's poorer nations is stark: stand by and watch it carry the richer nations forward, or jump on and hope to steer it as best they can."